

Name: _____

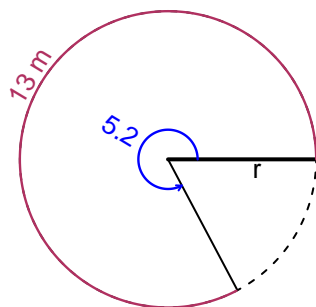
Date: _____

Trig Final (SLTN v693)

- You can use a calculator (like [Desmos](#))
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 5.2 radians. The arc length is 13 meters. How long is the radius in meters?

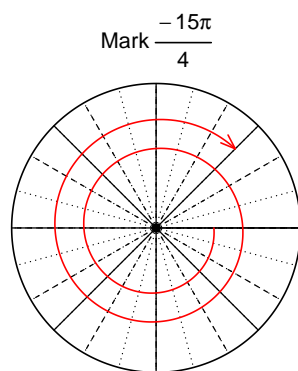


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 2.5$ meters.

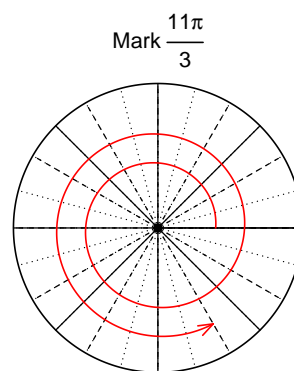
Question 2

Consider angles $-\frac{15\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(-\frac{15\pi}{4}\right)$ and $\cos\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\sin(-15\pi/4)$

$$\sin(-15\pi/4) = \frac{\sqrt{2}}{2}$$



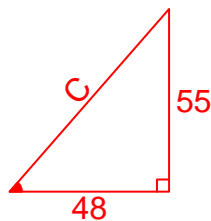
Find $\cos(11\pi/3)$

$$\cos(11\pi/3) = \frac{1}{2}$$

Question 3

If $\tan(\theta) = \frac{55}{48}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

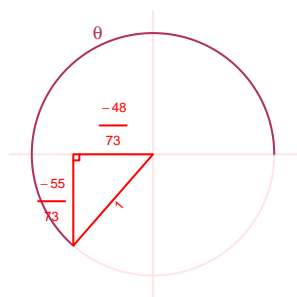
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}48^2 + 55^2 &= C^2 \\ C &= \sqrt{48^2 + 55^2} \\ C &= 73\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-48}{73}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.26 Hz, an amplitude of 4.43 meters, and a midline at $y = 7.09$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -4.43 \sin(2\pi 8.26t) + 7.09$$

or

$$y = -4.43 \sin(16.52\pi t) + 7.09$$

or

$$y = -4.43 \sin(51.9t) + 7.09$$